The fusion proteins showed both specificity and antimicrobial efficacy against *S. mutans*. Like the monclonal antibodies from which they are derived, the fusion proteins bind specifically to *S. mutans*. They also have anti-bacterial efficacy against the bacteria, but are effective at a much lower concentration than histatin 5 alone. This observation suggests that the recognition sequence is responsible for specific binding between the fusion protein and *S. mutans*, which locally enhances the concentration of histatin 5 at the bacterial cell surface. At the concentration at which the fusion protein showed antibacterial efficacy, the fusion proteins showed no inhibitory effect on other bacteria or host cells. Accordingly, these results suggest that the basic design described herein may be useful for generating antibody-based fusion proteins for treatment of other infections and infestations.

While various embodiments are disclosed in this application, it is apparent that the invention can be altered to provide other embodiments that utilize the composition and process of the invention. Therefore it will be appreciated that the scope of the invention is to be defined by the claims appended hereto rather than by the specific embodiments and examples that have been disclosed for the purposes of illustrating and explaining the invention.

What is claimed is:

1. A fusion protein for the targeted delivery of antimicrobial peptides comprising a recognition sequence that specifically binds to a microbial organism, and an anti-microbial peptide.

2. The fusion protein for the targeted delivery of antimicrobial peptides of claim 1, further comprising a linker peptide.

3. The fusion protein for the targeted delivery of antimicrobial peptides of claim 1, wherein the microbe is selected from the group consisting of bacteria, ricketsia, fungi, yeasts, protozoa and parasites.

4. The fusion protein for the targeted delivery of antimicrobial peptides of claim 1, wherein the antimicrobial peptide is selected from a group consisting of histatin, defensin, magainin, cecropin, cathelicidin, buforin, gaegurin, indolicidin, tachyplesin, andropin, bactenecin, protegrin, apidaecin, bacteriocin, clavanin, alexomycin, nisin, and ranalexin and deriviatives thereof.

5. The fusion protein for the targeted delivery of antimicrobial peptides of claim 1, wherein the microbe is a cariogenic organism.

6. The fusion protein for the targeted delivery of antimicrobial peptides of claim 5, wherein the microbe is *Streptococcus mutans*.

7. The fusion protein for the targeted delivery of antimicrobial peptides of claim 6, wherein the antimicrobial peptide is histatin 5, which is coded for by the nucleic acid sequence designated SEQ ID NO: 1.

8. The fusion protein for the targeted delivery of antimicrobial peptides of claim 6, wherein the antimicrobial peptide is, dhvar1, which is coded for by the nucleic acid sequence designated SEQ ID NO: 5.

9. The fusion protein for the targeted delivery of antimicrobial peptides of claim 6, wherein the recognition sequence is at least a portion of a variable region of an immunoglobulin that specifically binds to *S. mutans*, and the antimicrobial peptide is selected from the group consisting of histatin 5, having the amino acid sequence designated SEQ ID NO: 4, and dhvar1, having the amino acid sequence designated SEQ. ID NO: 8.

10. A method of treating microbial infection comprising exposing the microbe to a fusion protein comprising a recognition sequence that specifically binds to the microbe and an antimicrobial peptide

11. The method of claim 10, wherein the microbe is *Streptococcus mutans* and the anti microbial peptide is selected from a group consisting histatin 5 and dhvar 1.

12. The method of claim 10, wherein the anti-microbial peptide is buforin and the microbe is selected from a group consisting *Escherichia coli, Shigella dysenteriae, Salmonella typhimurium, Streptococcus pneumoniae, Staphylococcus aureus*, and *Pseudomonas aeruginosa.*

13. The method of claim 10, wherein the anti-microbial peptide is a cecropin and the microbe is selected from a group consisting *Escherichia coli, Shigella dysenteriae, Salmonella typhimurium, Streptococcus pneumoniae, Staphylococcus aureus*, and *Pseudomonas aeruginosa.*

14. The method of claim 10, wherein the anti-microbial peptide is an indolicidin and the microbe is selected from a group consisting of *Escherichia coli, Shigella dysenteriae, Salmonella typhimurium, Streptococcus pneumoniae, Staphylococcus aureus*, and *Pseudomonas aeruginosa.*

15. The method of claim 10, wherein the anti-microbial peptide is a magainin and the microbe is selected from a group consisting *Escherichia coli, Shigella dysenteriae, Salmonella typhimurium, Streptococcus pneumoniae, Staphylococcus aureus, and Pseudomonas aeruginosa, Candida albicans, Cryptococcus neoformans, Candida krusei, Helicobacter pylori, and herpes simplex virus.*

16. The method of claim 10, wherein the anti-microbial peptide is *nisin* and the microbe is selected from a group consisting *Escherichia coli, Shigella dysenteriae, Salmonella typhimurium, Streptococcus pneumoniae, Staphylococcus aureus*, and *Pseudomonas aeruginosa.*

17. The method of claim 10, wherein the anti-microbial peptide is ranalexin peptide and the microbe is selected from a group consisting *Escherichia coli, Shigella dysenteriae, Salmonella typhimurium, Streptococcus pneumoniae, Staphylococcus aureus, Pseudomonas aeruginosa, Candida albicans, Cryptococcus neoformans, Candida krusei, and Helicobacter pylori.*

18. The method of claim 10, wherein the anti-microbial peptide is protegrin and the microbe is selected from a group consisting *Neisseria gonorrhoeae, Chlamydia trachomatis,* and *Haemophilus ducreyi.*

19. The method of claim 10, wherein the anti-microbial peptide is alexomycin and the microbe is selected from a group consisting *Camphylobacter jejuni, Moraxella catarrhalis*, and *Haemophilius influenzae.*

20. The method of claim 10, wherein the anti-microbial peptide is selected from the group consisting of defensin, α defensin and β pleated sheet defensin and the microbe is *Streptococcus pneumoniae.*

21. The method of claim 11 wherein the recognition sequence is at least a portion of a variable region of an immunoglobulin selected from the group consisting of SWLA1, SWLA2 and SWLA3.

22. The fusion protein of claim 1 wherein the recognition sequence is a polypeptide and its target is a ligand.